

# SESSIONS

REGISTRATION, WORKSHOP DAY , & EVENING COCKTAIL RECEPTION -  
29/11/2021

Biostimulants World Congress

Delivered as a Hybrid Event

Live In-Person Experience: 29 November - 2

December 2021

DIPLOMAT BEACH RESORT HOLLYWOOD | FLORIDA

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## Event Registration Opens

13:00 - 14:00

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## Marketing Biostimulants Workshop Day

14:00 - 18:00

Join us for a marketing focused workshop where we will discuss core marketing principles , key marketing challenges and possible solutions linked to marketing biostimulant products.

Key areas that we will cover:

1. Marketing - your brand and how to position your product in the market
2. Marketing strategy - what works and what doesn't
3. Marketing : the difference as a start up vs established organisation - what can we learn from both?
4. Marketing biostimulants- how to ensure you know your customer - case studies and key learnings

This workshop is for anyone involved with marketing biostimulant products or involved with sales and product development.

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## Networking Cocktail Reception

18:00 - 21:00

Open to everyone who is joining the event, we are pleased to welcome you to the cocktail reception!

# SCHEDULE

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TIME	
13:00	13:00 - Event Registration Opens
14:00	14:00 - Marketing Biostimulants Workshop Day
15:00	
16:00	
17:00	
18:00	18:00 - Networking Cocktail Reception

# SESSIONS

DAY 1 - 30/11/2021

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## Opening Remarks from the Chairperson

08:20 - 08:30  
PLENARY KEYNOTE SESSION

### Participants

**Patrick Brown (Scientific Committee Chair)** - University of California, Davis, University of California, Davis

## tbc

08:30 - 09:10  
PLENARY KEYNOTE SESSION

### Participants

**Jo Handelsman (Plenary Keynote Speaker)** - Director of the Wisconsin Institute for Discovery, University of Wisconsin-Madison

## Keynote: Biostimulants the Microbiome and Soil Health

09:10 - 09:50  
SESSION 1: Biostimulants the Microbiome and Soil Health

### Participants

**Angela Sessitsch (Keynote Speaker)** - Head of the Bioresources Unit, AIT Austrian Institute of Technology

## Soil Microbial Composition Allows Assessment of Biological Product Effectiveness and Crop Yield Prediction

09:50 - 10:15  
SESSION 1: Biostimulants the Microbiome and Soil Health

Understanding the effectiveness and potential mechanism of action of agricultural biological products under different soil profiles and crops will allow more precise product recommendations based on local conditions and will ultimately result in increased crop yield.

We aimed to use bulk and rhizosphere soil's microbial composition and structure to evaluate the effect of a *Bacillus amyloliquefaciens* strain inoculant on potatoes, and to explore its relationship with crop yield.

We implemented a field trial protocol and NGS and bioinformatics approaches to assess the bacterial and fungal biodiversity in 185 soil samples, distributed over four different time points -from planting to harvest -from three different geographical regions in the United States.

In addition to variety, phenological stage of the potato plant and geography being important factors defining the microbiome composition and structure, the microbial inoculant applied as a treatment also had a significant effect. However, treatment preserved the native communities without causing a detectable long-lasting effect on the alpha- and beta-diversity patterns after harvest.

Specific taxonomic groups, and most interestingly the structure of the fungal and bacterial communities (measured using co-occurrence and co-exclusion networks), changed after inoculation. Additionally, we use trained a Random Forest model that used soil microbiome composition and structure data to estimate if a bulk or rhizosphere soil sample came from a low or high yield block with relatively high accuracy, concluding that the structure of fungal communities is biomarkers of potato yield.

### Participants

**Alberto Acedo** - CSO, Biome Makers Inc.

## Networking Break, Exhibition Viewing & Poster Tour

10:15 - 11:00

To join a poster tour please meet at reception. You will then be shown around a select number of posters to meet with the authors and engage in Q&A with them.

## Microbial modes of action of alkaline *Ascophyllum nodosum* extract-based biostimulants: Stimulation of soil health and plant-microbe symbiosis

11:00 - 11:25  
SESSION 1: Biostimulants the Microbiome and Soil Health

Alkaline extracts of *Ascophyllum nodosum* seaweed are potent mixtures of bioactive compounds that improve crop quality, stress tolerance, and yield. It is furthermore becoming clear that *A. nodosum* extracts (ANE) can indirectly aid plant health through beneficially impacting the structure and function of the plant microbiome, supporting the important functions these microbes play in plant health and productivity.

Our studies reported here demonstrate broad stimulation of microbial abundance and activity by ANE, supporting the establishment of productive soil microbial biomass. This effect was particularly amplified under abiotic stress, whereby the soil of plants undergoing drought exhibited 50 % increased microbial respiration as a result of treatment with ANE. This suggests that, in addition to alleviating abiotic stress in plants, ANE can maintain activity of the soil microbiome under adverse environmental conditions, enabling continued provision of soil health services to plants.

Our studies also examined the promotion of specific plant-microbe symbioses, with particular emphasis arbuscular mycorrhizal fungi (AMF). We demonstrate that ANE stimulates the proliferation of AMF spores, as well as promoting more rapid colonization within plant roots. Gene expression analysis demonstrated upregulation of plant genes responsible for the accommodation of the fungus following either drench or foliar application of ANE, supporting the establishment of this agriculturally vital symbiosis. Overall, our work provides novel insight into the indirect modes of action of ANE, demonstrating how this class of biostimulants not only directly enhances the tolerance of plants to abiotic stress, but also leverages the benefits of a healthy plant microbiome.

### Participants

**Timo van der Zwan** - Molecular Biologist, Acadian Plant Health

## This session will be hosted by AlgaEnergy - title to be updated shortly

11:00 - 11:25  
Biostimulant Business Innovation

During this session we will explore investment into this sector, how to build up your portfolio with investment, how to go about securing investment and how to work with partners to take your biostimulant business to the next level. Speakers within this session are experienced leaders who have a wealth of knowledge and expertise when it comes to investment strategy and working in partnerships.

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## The accelerated flowering in tomato and Arabidopsis by the Nematophagous fungus Pochonia chlamydosporia and its relation with jasmonate signaling

11:25 - 11:50

SESSION 1: Biostimulants the Microbiome and Soil Health

The fungal parasite of nematode eggs Pochonia chlamydosporia is also a root endophyte known to promote growth of some plants such as Barley and tomato. This study demonstrates that P. chlamydosporia colonizes A. thaliana. Root colonization monitored with green fluorescent protein-tagged P. chlamydosporia and quantitative PCR (qPCR) quantitation methods revealed root cell invasion. Fungal inoculation reduced flowering time and stimulated plant growth, as determined by total fresh weight increase, faster development of inflorescences and siliques, and a higher yield in terms of seed production per plant. Precocious flowering was associated with significant expression changes in key flowering-time genes. In addition, we also provided molecular and genetic evidence that point towards jasmonate signaling as an important factor to modulate progression of plant colonization by the fungus. Our results indicate that P. chlamydosporia provides benefits to the plant in addition to its nematophagous activity. This report highlights the potential of P. chlamydosporia to improve yield in economically important crops.

### Participants

**Ernesto Alejandro Zavala** - Head Researcher, Atlantica Agricola

## THE INNOVATION STAGE- ROUND 1

11:25 - 12:40

Biostimulant Business Innovation

Join us for short and snappy product info pitches. During this session 6 companies will showcase their technologies and cover:

1. Biostimulant technology :what is it and how does it work?
2. Recent results
3. Market information linked to this product
4. The biggest hurdle faced developing this product
5. The biggest opportunity we see with this product

There will be 6 pitches taking place (10 mins each).

Speakers taking part in this session include:

Speaker 1: A representative, Bioiberica , Spain

Speaker 2: Valeria Contartese, R&D Director, Green Has Italia

Speaker 3: Lisha Daniel, Sr. Technical Manager - Plant Nutrition, Sensient Technologies, USA

Speaker 4: A representative, Innovak Global

Speaker 5: Laurent Aubertin, Director of Product Development and Agronomy, Van Iperen, The Netherlands

Speaker 6: A representative, Agroindustrial kimatec

## Worm compost tea's plant growth-promoting power, is it the micro-organisms or chemical properties?

11:50 - 12:15

SESSION 1: Biostimulants the Microbiome and Soil Health

Seedlings of tomato (*Solanum lycopersicum* cv. Rutgers) were treated with vermicompost tea (VCT), autoclaved vermicompost tea (AVCT), or a control (water) for 3 times during 7 weeks of the experiment period to determine if the effects of this biological fertilizer on plant growth are due to the presence of microorganisms or chemical nutrients. A significant increase was observed in plant growth with either the VCT or AVCT treatments compared to the control, while for most measures, plant growth was higher in the AVCT versus the VCT treatment. Autoclaving VCT significantly increased the availability of some mineral nutrients. A metagenomic analysis of bacterial specimens in VCT revealed the most abundant genera which secrete known plant-growth-promoting hormones. It appears that the major benefits of vermicompost tea do not necessarily require living organisms as both VCT and AVCT treatments significantly increased plant biomass. Thus, the growth-promoting potential of vermicompost tea may not be associated with microbial biomass per se but rather, the release of extracellular microbial signals/nutrients and/or the nutrient availability of the applied vermicompost tea.

### Participants

**Jamal Javanmardi** - Assistant Professor, California State University - Chico

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## Commercial aspects of biofertilizers and biostimulants development utilizing rhizosphere microbes

12:15 - 12:40

SESSION 1: Biostimulants the Microbiome and Soil Health

The beneficial microbiomes associated with the rhizosphere provide innumerable benefits to plants and the environment. They collectively maintain the health and nutrient dynamics of the soil, sequester/mobilize nutrients to plants, improve plant growth, and defend them from biotic and abiotic stress. Due to modern cultivation practices and climate change, sustenance and efficacy of beneficial soil microbiomes have deteriorated over the years. It is therefore essential to identify, mass multiply and recharge the rhizosphere with the most effective and multifunctional beneficial microbiome.

Regulations and nomenclature for commercializing beneficial microbiomes have differed from country to country. Guidelines have been proposed for the use of beneficial microbes that are not covered under the plant protection code. They were, however, not strictly implemented in several countries due to their safety and green nature. As the global biostimulant and biofertilizer market is expected to reach USD 4.9B by the year 2025 with an annual growth rate of almost 12%, global regulatory mechanisms for these have become active since 2018. The overall commercial potential of biostimulants and biofertilizers is high in Europe followed by North America, Asia Pacific and Latin American countries.

This talk will highlight the importance of beneficial microbes, benefits, nomenclature, commercial potential, regulations and importance of uniform global guidelines for product registration. The need for integrating biofertilizers with commercial fertilizers, introducing new consortia formulations, economics and bottlenecks will also be discussed. Unless we strive to make the regulations uniform and simple globally, it will be difficult to increase their adoption widely.

### Participants

**Dominic Arun Joseph** - Director, Varsha Bioscience and Technology India Pvt. Ltd.

## Networking Break, Exhibition Viewing & Poster Tour

12:40 - 14:10

## Keynote: Biostimulants and Plant Stress Tolerance

14:10 - 15:00

SESSION 2: Biostimulants and Plant Stress Tolerance

### Participants

**Leon Kochian (Keynote Speaker)** - Canada Excellence Research Chair in Global Food Security and Associate Director of the Global Institute of Food Security, University of Saskatchewan

## This session will be hosted by Hello Nature

14:10 - 14:35

Market Access & Strategy

## The Next Generation of Biostimulant Products: Finding Synergies to Make 1+1=3 in the Field

14:35 - 15:00

Market Access & Strategy

Courtenay will explore the importance of solution selling vs product selling. How to increase market access and market share through product differentiation and margin protection. How do we bring these technologies to market, package them and turn them into field ready solutions for growers.

### Participants

**Courtenay Wolfe** - Chair and Chief Executive Officer, FBSciences, Inc

## Exogenous RNA as signaling molecules between plants: a new concept for the development of plant biostimulants

15:00 - 15:25

SESSION 2: Biostimulants and Plant Stress Tolerance

Exogenous application of synthetic double-stranded RNA is a breakthrough technology in agriculture to influence plant traits or to fight diseases. Exogenous RNAs may either be taken up by the fungal cells that they come into contact with on the leaf surface or be taken up by plant cells first and then into fungal cells. Interestingly, locally sprayed dsRNAs also inhibit pathogen virulence at distal, non-treated leaves his suggests that these artificially-synthesized dsRNAs spread systemically within plants after external application on the leaf surface. Although plants seem to uptake exogenous RNA that was artificially designed to target specific genes, followed by the activation of the RNAi machinery, it is not known whether plants use RNAs themselves as signaling molecules in plant-to-plant communication. Exogenous RNAs from the environment, if taken up by some living organisms can indeed induce RNAi. This phenomenon, known as "environmental RNAi", has been observed in nematodes and insects, and host Arabidopsis cells appear to secrete exosome-like extracellular vesicles to deliver plant sRNAs into Botrytis cinerea. Here, we show that miRNAs produced by plants represent signaling molecules affecting gene expression in other, nearby plants. Our observations highlight the existence of a mechanism in which miRNAs represent signaling molecules that enable communication between plants. This mechanism can be exploited to develop a new class of biostimulants.

### Participants

**Antonietta Santaniello** - Plant Physiology Specialist, Valagro SpA

## Agrauxine, expert in biosolution coming out fermentation. How we develop and commercialize biostimulant solutions. A case study insight to Moka, a yeast extract-based solution

15:00 - 15:25

Market Access & Strategy

- In the current context of reducing conventional agricultural inputs, depleting soils and increasing climate constraints, biostimulants are emerging as new solutions for farmers. Agrauxine by Lesaffre is a business unit of Lesaffre, expert in fermentation dedicated to crop health and nutrition, and developing biosolutions products coming out fermentation.
- Agrauxine biostimulant products are based in yeast and derivatives and propose to farmers unique mode of action with objective to mitigate impact of abiotic stress, increase final yield and improve fruit quality.
- Agrauxine is already commercializing the product Smartfoil in more than 20 countries; a biostimulant based on yeast fermentation metabolites to mitigate impact of abiotic stress at flowering.
- Its high experience thanks to Smartfoil to enter in new market strengthens Agrauxine expertise in order to commercialize biostimulant product additionally to its high technical knowledge thanks to its department of R&D, Technical Development, Regulatory, Marketing in order to well characterize the solution and position on the market.
- Agrauxine is now launching a new biostimulant, Moka, based on yeast extract. The work of more than 5 years allowed to define product mode of action and confirm its positioning on a key crop like grape in order to stimulate photosynthetic activity and improve qualitative compound by the application after fruit set.
- Different challenges were faced and considered by Agrauxine teams in order to well characterize the product, define the right claims and crops to target in order to then position and commercialize the product on the market.
- Its liquid formulation, very easy to use in foliar spraying, allows farmers to blend it in tank-mix with conventional products if needed and without any constraints of storage highly convinced farmers.

### Participants

**Fabien Achard** - Biostimulant Product Manager, Agrauxine by Lesaffre

## Biostimulants mode of action in plant growth and gene regulation against hypoxia effects.

15:25 - 15:50

SESSION 2: Biostimulants and Plant Stress Tolerance

While our climate becomes more unpredictable, water availability can reach extremes from excess to depletion. Water saturation on plant roots (or flooding) limits oxygen availability to plant tissues, leading to hypoxia. QUB has investigated the effects and efficiency of several biostimulants enhancing plant tolerance in *Arabidopsis thaliana* (Col. FRI) plants during and after a 3-weeks-long exposure to hypoxia. A range (3 to 5) of dosages was tested for each biostimulant: every dosage was used in four pots, each one accommodating four plants. To investigate priming potential, biostimulants were applied to plants leaves 7 days before flooding, and stress was maintained for 3 weeks. Another aim was to identify possible recovery effects.

For such, plants were maintained under hypoxia condition for 3 weeks, and treated with biostimulants one day before being withdrawn from stress. For both assessments, plant growth and development were systematically monitored and quantified by measuring the elongation of 5 newly emerged leaves on each plant, in a 24-hour period, every 7 days during stress and one week after stress was terminated. Main results obtained on phenotypical analysis showed positive impacts from biostimulants on plant growth, even after three weeks of root submersion and on further recovery, one week after the flood was finished. Further analyses are on-going to assess and quantify changes in gene expression. Details on methodology, results, and discussion will be presented at the conference.

Keywords: flooding, hypoxia, biostimulants, priming, recovery, *Arabidopsis thaliana*

### Participants

Clara Piccinini - PhD Student, Tradecorp International

## How to turn beneficial elements into effective biostimulants? Case study of INTERMAG worldwide success.

15:25 - 15:50

Market Access & Strategy

- Beneficial elements are not essential for plants, but applied at low concentrations they positively affect plant growth and development as well as their tolerance to stress factors, which results in higher yield and better yield quality.
- To be effective in agricultural practice beneficial elements must be provided in forms, which are plant available, water soluble, stable in wide range of pH, and compatible with agrochemicals.
- INTERMAG is a worldwide leader in manufacturing and launching biostimulants based on beneficial elements in plant available forms. The first biostimulant based on titanium was launched in the 1990s. Since then, INTERMAG's portfolio has been expanded to include products based on silicon, vanadium, iodine and selenium. Currently, INTERMAG's biostimulants based on beneficial elements are present in about 45 markets worldwide.
- Diligently selected forms in which beneficial elements are present in the products, biological and molecular studies explaining and describing products' mode of action and numerous laboratory experiments and field trials confirming the effectiveness of the products are the key to the worldwide success.
- The presentation will show how INTERMAG develops and commercializes biostimulants based on beneficial elements in plant available forms and what challenges are faced to enter and position the technology on worldwide markets.

### Participants

Anna Konieczny - Market Development Manager, INTERMAG

## Networking Break, Exhibition Viewing & Poster Tour

15:50 - 16:25

## Development of a drought' resistance bioassay

16:25 - 16:50

SESSION 2: Biostimulants and Plant Stress Tolerance

Drought, which is one of the main abiotic stresses amplified by climate change, affects plant growth and development with an impact on crop yield and grassland perennity. Biostimulants offer a novel approach to mitigate stress-induced limitations. Due to the high diversity of biostimulants and crop targets, their marketing requires reliable and reproducible screening tools.

A bioassay was developed under controlled conditions to evaluate the biostimulating effect of algal extracts on ryegrass (*Lolium perenne*) subjected to drought stress.

Three main periods of biostimulant application and plant monitoring were defined in order to optimise the understanding of biostimulant effects: (i) biostimulant application several days before stopping the water supply (start of the priming period), (ii) biostimulant application at water withholding (start of the drought stress period) and (iii) biostimulant application at rewatering (start of the recovery period). The period length and the plant management (transplanting density, type of substrate, amount of watering, environmental conditions, etc.) were adjusted to optimize the monitoring of indicators of drought stress and resistance. During the development of this bioassay, several relevant and reliable indicators were identified in relation to nitrogen uptake, shoot growth, stomatal regulation, membrane stability, osmotic adjustment, carbohydrate status, antioxidant potential. Each of them provides information on different mechanisms involved in drought resistance.

We finally established a reproducible, reliable and adjustable protocol for other species and other abiotic stresses in order to test biostimulant effects.

This project was co-funded by the Regional Council of Normandy and the European Union (Fonds Européen de Développement Régional, FEDER).

### Participants

Antoine Grandin - Agronomie & nutrition NCS, UMR UCN/INRAE EVA

## This session is on hold for Yara

16:25 - 16:50

Market Access & Strategy

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## First robust field trial tool adapted to evaluate the agronomic value of biostimulants

16:50 - 17:15

SESSION 2: Biostimulants and Plant Stress Tolerance

The aim of this work was to develop a new, robust field trial method based on geostatistics to evaluate the efficacy of biostimulant treatments at the farmer scale.

Currently, microplots field trial designs and their associated statistics tools are not able to efficiently discriminate between the effects of fertilizer and biostimulant products, both of which are strongly linked to the soil environment. To evaluate this effect several trials with multiple repetitions are necessary (>10), which is both costly and time-consuming. Monitoring spatial distribution and modelization provide powerful tools to evaluate fertilizer and biostimulant products. These tools work at the farmer scale, reflecting the real field effect.

In the past three years we have applied geostatistics to over 50 field trials. By monitoring the spatial distribution, we have built a kriging model based on the optimal points required for each trial. Thanks to this method we were able to evaluate the agronomic effects of fertilizer and biostimulant products with an average precision of 85%, equivalent to a micro-plot statistical test at 99% of significance.

To conclude, we have developed a new field trial design utilizing geostatistic tools that allows us to efficiently evaluate the agronomic effects of fertilizer and biostimulant products. All design and method are open to be shared.

### Participants

**Guilherme Oliveira** - Project Coordinator, Lallemand Plant Care

## This session is on hold for Asfert Global

16:50 - 17:15

Market Access & Strategy

## Evaluation of Biostimulants for Plant Stress Tolerance - overcoming challenges for an objective assessment in field trials

17:15 - 17:40

SESSION 2: Biostimulants and Plant Stress Tolerance

Development of biostimulants has unique challenges especially at the field experiment stage of evaluation. The early development experiments must have designs to evaluate potential efficacy across environments with an objective assessment of crop vigor and health throughout the growing season, avoiding approaches that may introduce a bias into the results. Our AgriThority experience with biostimulants and biofertilizer field trials began in 2009 and has given us 11 years of data sets from more than 325 experiments across several continents. This breadth of evaluation provided many lessons about process management for field experiments based on the product type and stage of development, as well as evaluation methods. Based on our large experimental database we generated a range of field trial designs adjusted to different product types and environments, strongly based on digital measurement technologies for fine-scale field characterization and crop growth assessment, plus robust spatial statistics methodologies that allow an objective evaluation of product performance. An investment in early development increases effectiveness of field experiments at the later and more expensive stages. Environmental ranges and methods of objective quantification are major considerations to evaluate response in variable soil types, stress and other conditions. The proper evaluation at every development stage can prove biostimulant claims while potentially accelerating registration, introduction and, ultimately, grower adoption. In this presentation we will provide several examples of potential pitfalls and solutions to early evaluation of biostimulant effects on crops at both small plot and field scales.

### Participants

**Ignacio Colonna** - Global Director, Science & Technology, AgriThority

## Revisiting the Biomanufacturing Process for Improved Delivery of Microbial Biostimulants

17:15 - 17:40

Market Access & Strategy

### Participants

**Rebecca Williams-Wagner** - Principal Scientist, 3Bar Biologics, Inc

## Protein hydrolysates as potential biostimulant in vegetables: elucidating their mechanism and optimizing their effectiveness through a translational research approach

17:40 - 18:05

SESSION 2: Biostimulants and Plant Stress Tolerance

Among the different categories of plant biostimulants, protein hydrolysates (PHs) obtained from the hydrolysis of protein matrixes, are receiving great interest especially in Europe. PHs are known to stimulate the root growth mainly through auxin-like mechanisms, due to the presence of specific signaling peptides, or by increasing the synthesis of indol-3-acetic acid induced by the supplementation of tryptophan, which is the biosynthesis precursor. A more vigorous root system in PHs-treated plants can increase their ability to take up nutrients from the external environment and improve their capacity to tolerate abiotic stresses. The free amino acids and signaling peptides supplied through PHs treatments can be absorbed by plants and used directly within the primary metabolism, for the synthesis of protein and/or other N-based compounds or used as source of carbon and nitrogen. The main objective of the current paper is to present the strategy and results of the first Project "PHOBOS" financed by the Italian Ministry of Education, University and Research aimed to discover and understand the biostimulant action of new vegetal derived- PHs on tomato and lettuce as model crops. The biostimulant action is evaluated in terms of morpho-physiological traits, and molecular and biochemical processes under both optimal and adverse conditions (salinity and/or N deficiency) using advanced technologies such as high-throughput plant phenotyping, metabolomics, transcriptomics and ionomics. The multidisciplinary approach allowed to identify PHs and their fractions able to stimulate plant growth and enhance crop tolerance to selected abiotic stresses.

### Participants

**Giuseppe Colla** - Professor, University of Tuscia

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TIME	BIOSTIMULANT BUSINESS INNOVATION	MARKET ACCESS & STRATEGY	PLENARY KEYNOTE SESSION	SESSION 1: BIOSTIMULANTS THE MICROBIOME AND SOIL HEALTH	SESSION 2: BIOSTIMULANTS AND PLANT STRESS TOLERANCE
08:00			08:20 - Opening Remarks from the Chairperson 08:30 - tbc		
09:00				09:10 - Keynote: Biostimulants the Microbiome and Soil Health 09:50 - Soil Microbial Composition Allows Assessment of Biological Product Effectiveness and Crop Yield Prediction	
10:00	10:15 - Networking Break, Exhibition Viewing & Poster Tour	10:15 - Networking Break, Exhibition Viewing & Poster Tour	10:15 - Networking Break, Exhibition Viewing & Poster Tour	10:15 - Networking Break, Exhibition Viewing & Poster Tour	10:15 - Networking Break, Exhibition Viewing & Poster Tour
11:00	11:00 - This session will be hosted by AlgaEnergy - title to be updated shortly 11:25 - THE INNOVATION STAGE-ROUND 1			11:00 - Microbial modes of action of alkaline Ascophyllum nodosum extract-based biostimulants: Stimulation of soil health and plant-microbe symbiosis 11:25 - The accelerated flowering in tomato and Arabidopsis by the Nematophagous fungus Pochonia chlamydosporia and its relation with jasmonate signaling 11:50 - Worm compost tea's plant growth-promoting power, is it the micro-organisms or chemical properties?	

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TIME	BIOSTIMULANT BUSINESS INNOVATION	MARKET ACCESS & STRATEGY	PLENARY KEYNOTE SESSION	SESSION 1: BIOSTIMULANTS THE MICROBIOME AND SOIL HEALTH	SESSION 2: BIOSTIMULANTS AND PLANT STRESS TOLERANCE
12:00	12:40 - Networking Break, Exhibition Viewing & Poster Tour	12:40 - Networking Break, Exhibition Viewing & Poster Tour	12:40 - Networking Break, Exhibition Viewing & Poster Tour	12:15 - Commercial aspects of biofertilizers and biostimulants development utilizing rhizosphere microbes 12:40 - Networking Break, Exhibition Viewing & Poster Tour	12:40 - Networking Break, Exhibition Viewing & Poster Tour
13:00					
14:00		14:10 - This session will be hosted by Hello Nature 14:35 - The Next Generation of Biostimulant Products: Finding Synergies to Make 1+1=3 in the Field			14:10 - Keynote: Biostimulants and Plant Stress Tolerance
15:00	15:50 - Networking Break, Exhibition Viewing & Poster Tour	15:00 - Agrauxine, expert in biosolution coming out fermentation. How we develop and commercialize biostimulant solutions. A case study insight to Moka, a yeast extract-based solution 15:25 - How to turn beneficial elements into effective biostimulants? Case study of INTERMAG worldwide success. 15:50 - Networking Break, Exhibition Viewing & Poster Tour	15:50 - Networking Break, Exhibition Viewing & Poster Tour	15:50 - Networking Break, Exhibition Viewing & Poster Tour	15:00 - Exogenous RNA as signaling molecules between plants: a new concept for the development of plant biostimulants 15:25 - Biostimulants mode of action in plant growth and gene regulation against hypoxia effects. 15:50 - Networking Break, Exhibition Viewing & Poster Tour

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TIME	BIOSTIMULANT BUSINESS INNOVATION	MARKET ACCESS & STRATEGY	PLENARY KEYNOTE SESSION	SESSION 1: BIOSTIMULANTS THE MICROBIOME AND SOIL HEALTH	SESSION 2: BIOSTIMULANTS AND PLANT STRESS TOLERANCE
16:00		<p><b>16:25</b> - This session is on hold for Yara</p> <p><b>16:50</b> - This session is on hold for Asfert Global</p>			<p><b>16:25</b> - Development of a drought' resistance bioassay</p> <p><b>16:50</b> - First robust field trial tool adapted to evaluate the agronomic value of biostimulants</p>
17:00		<p><b>17:15</b> - Revisioning the Biomanufacturing Process for Improved Delivery of Microbial Biostimulants</p>			<p><b>17:15</b> - Evaluation of Biostimulants for Plant Stress Tolerance - overcoming challenges for an objective assessment in field trials</p> <p><b>17:40</b> - Protein hydrolysates as potential biostimulant in vegetables: elucidating their mechanism and optimizing their effectiveness through a translational research approach</p>

# SESSIONS

DAY 2 - 01/12/2021

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## Keynote: Biostimulants, Nutrient Use Efficiency and Product Quality

08:30 - 09:10

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

### Participants

**Patrick Brown (Scientific Committee Chair)** -

University of California, Davis, University of California, Davis

## LL004: a novel biostimulant for improved yield and quality in fruits in phosphorus deficiency

09:10 - 09:35

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

Phosphorus is an essential nutrient in fertilisers. Yet the world's farmers depend on phosphorus sourced from finite phosphate rock, which are becoming more scarce, expensive and are concentrated in few countries.

The Project Plants for Plants (P4P) aims to improve resource efficiency of crops by introducing a new category of biostimulants. In actual practice, waste materials and by products are often seen as potential source of biostimulants, therefore the discovery of functional active ingredients is rather casual. P4P reverses this approach: first the problem is identified and then tailored compounds, based on specific Standardized Metabolites Phytocomplexes (SMPs) physically extracted from suitable organically grown plants, are produced and tested.

Among the products developed in this Project, and thanks also to the co-funding of the EU's LIFE Program (LIFE18 ENV/NL/000043), LL004 is based on a synergistic combination of specific heterosides and organic acids that is aimed to increase Phosphorus Use Efficiency (PUE).

Trials were performed in different crops families: the ones on apples, in 3/4 climatic conditions, showed that application of LL004 in both comfort and sub-comfort conditions increased fruits yield and/or quality, as colour, Brix and firmness. Moreover a trial on strawberries showed that at the end of the trial more available phosphorus could be found in the soil, compared to the soil of the untreated plants. To conclude, LL004 proved to be an effective biostimulant both in stressed and in the so-called comfort environment, demonstrating that even plants grown in optimal conditions are far from exploiting their whole genetic potential.

### Participants

**Cristina Sudiro** - Area Manager Plant Biostimulation, LANDLAB Srl

## Bioactivity of humic acids extracted from shale ore: Molecular characterization and structure-activity relationship with tomato plant yield and phenotype

09:35 - 10:00

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

The increasing demands for biostimulants in the agricultural market over the last years have posed the problem of regulating this product category by requiring the industry to make available the information that demonstrates efficacy and safety, including the explanation of the mode of action and the definition of bioactive constituents. In the present study, we tested the biostimulant properties of an ore-extracted humic acid (HA) on Micro-Tom tomato plants under increasing nutritional stress and investigated the correlation with the chemical features of (HA) by means of ultra-high resolution FTICR-MS, FT-ATR, and <sup>13</sup>C-NMR. The humic acid application proved effective in alleviating the nutritional stress by showing similar results to the control treatment with higher NPK nutrition. Increased yield and fruit quality, higher ascorbic acid content, and better root growth were the main parameters affected by humic (HA) application. Molecular-level characterization identifies the possible chemical drivers of bioactivity and includes flavonoids, quinones, and alkaloids among the most represented molecules, some of which exhibit antioxidant and antimicrobial activity. The redox effect was discussed as a determinant of the delicate homeostasis balance, capable of triggering plant defense response and eventually induce a protective priming effect on the plant.

### Participants

**Hiarhi Monda** - R&D Lab Director, Bio Huma Netics, Inc.

## Networking Break, Exhibition Viewing & Poster Tour

10:00 - 10:45

## A Brassinosteroid-based Biostimulant Integrated with an Innovative Crop System Improves Maize Productivity

10:45 - 11:10

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

Biostimulants are effective tools for enhancing plant growth and improving soil health thereby playing vital management roles in intensive and sustainable agriculture. For example, a multi-functional biostimulant consisting of brassinosteroids, 1-tricontanol, and B-vitamins enhances crop growth, reduces herbicide stress, and improves soil health based on several modes of action. Effectiveness of biostimulants may be increased by integration with innovative cropping systems. The solar corridor crop system (SCCS), based on wide-row spacing of maize, forms a corridor that provides more uniform distribution of incident sunlight available to all chloroplasts within the fully exposed leaves. The SCCS maximizes the capture of solar radiation and carbon dioxide, improving photosynthetic efficiency and grain yields. Previous field studies with selected maize hybrids showed equivalent or higher grain yields planted in wide rows (152 cm) compared with monocropping in standard row widths (76 cm). Positive impacts on the soil microbiome and biological activity were related to increased labile carbon released from corn roots, linked to increased photosynthesis in the SCCS. Because 1-tricontanol increases chloroplast numbers in plant leaves, enhances stomatal development, and subsequently increases photosynthesis, we evaluated the multi-functional biostimulant applied to maize in the SCCS for potential synergistic increases in crop performance in 2018-19. Biostimulant increased leaf chlorophyll of maize planted in the SCCS; maize grain yield increased with biostimulant (450 to 1500 kg/ha above controls); and yield components of kernels/ear and ear length increased. Results demonstrate the potential of biostimulants as integral management components contributing to the sustainability and efficiency of innovative cropping systems.

### Participants

**Robert Kremer** - Professor of Soil Microbiology, University of Missouri

## Shaping the rhizosphere: Can in planta rhizobiome selection for phosphate solubilizing bacteria outperform classical in vitro selection methods?

11:10 - 11:35

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

Phosphorus is, next to nitrogen, one of the key nutrients for plant growth and development. As the majority of P in soils is bound to recalcitrant organophosphates, adsorbed on clay minerals or fixed in metal complexes, plants are often suffering of P-deficiency. The rising ecological awareness on the excessive use of chemical (P-)fertilizers led to the quest for highly efficient, beneficial phosphate solubilizing microorganisms. It was at the previous Biostimulants World Congress (4th BWC, 2019) that we highlighted pitfalls of the commonly used in vitro isolation and selection procedures, in which a major concern was the possible lack of rhizosphere competence of the bacterial isolates or consortia. As an alternative, we presented an in planta enrichment platform for the successful selection of rhizosphere competent, phosphate solubilizing bacteria, in which plants were fully relieved of P-stress. In this follow-up research, a metabarcoding analysis was performed to assess the bacterial composition of the sequentially enriched consortia. Trends in plant P-content were similar to trends in abundance of Proteobacteria, Verrucomicrobia and Actinobacteria. Additionally, a total of 250 bacterial isolates were selected in vitro from the enriched consortia, evaluated for their phosphate solubilizing traits (acid production, siderophore production, growth on selective media), their phosphate solubilizing capacity in liquid medium and their root colonizing ability (motility assay). Metabarcoding analysis and in vitro experiments were compared side by side to evaluate the added value of the in planta enrichment platform over the classical in vitro selection method.

### Participants

Noemie De Zutter - PhD researcher, Ghent University

## This session is on hold for Stoller

11:10 - 11:35

Biostimulant Product Development Case Studies

## Ascopyllum nodosum biostimulants and their role in reducing nitrogen inputs for sustainable crop production

11:35 - 12:00

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

Ascopyllum nodosum biostimulants and their role in reducing nitrogen inputs for sustainable crop production

Oscar GoÅ±1, Å?ukasz Å?angowski1, Ewan Feeney1, Patrick Quille2 and Shane Oâ€™Connell1

1 Brandon Bioscience, Tralee, Co. Kerry, Ireland.

2 Plant Biostimulant Group, Shannon Applied Biotechnology Centre, Munster Technological University, Kerry, Tralee, Co. Kerry, Ireland.

Agricultural production utilises large amounts of mineral nitrogen (N) fertilisers to secure high crop yields. It is estimated that up to 65% of this N fertiliser is not taken up by crops and is lost to the environment through gaseous emissions and leaching to ground water [1]. The application of biostimulants derived from extracts of the brown seaweed *Ascopyllum nodosum* are widely used and trusted by growers as a sustainable crop production input [2]. Measurable compositional and plant biostimulatory differences between *Ascopyllum nodosum* extracts (ANEs) have been reported [3-4], highlighting the association between them. Data on how ANEs influence N uptake and assimilation in crops is limited. In this research, a specifically engineered formulation of ANE (PSI-362) was found to influence nitrogen use efficiency (NUE) in *Arabidopsis thaliana* and commercial crops in multi-year field trials resulting in yield maintenance or increase using 25% less N input. The ANE biostimulant was applied through different methods with robust effects demonstrated in both foliar and soil applications. A key indicator of ANE mediated NUE was increased shoot nitrate content which was associated with upregulation in the expression of root nitrate transporter genes. In addition the activity of critical enzymes in N assimilation and the content of N assimilation metabolites were increased. These biological changes were translated into enhanced NUE derived traits in harvested grain. The use of engineered ANE biostimulants that are optimised for NUE have the potential to deliver significant returns for the grower (with reduced N costs) and the environment versus generic ANE™s.

### Participants

Shane O'Connell - R&D Manager, Brandon Bioscience

## This session is on hold for Fertinagro

11:35 - 12:00

Biostimulant Product Development Case Studies

This session will explore regulatory developments in Brazil for Biostimulants

## Co-inoculation using the PGPR species of *Azospirillum brasilense* - Brazilian case

12:00 - 12:25

SESSION 3: Biostimulants, Nutrient Use Efficiency and Product Quality

Co-inoculation using the PGPR species of *Azospirillum brasilense* - Brazilian case

Castro, J R P1

1ANPII â€™ President of the Brazilian Association of Inoculant Producers and Importers and Marketing Director at Vittia Group (jroberto@vittia.com.br).

Microbial inoculants or biofertilizers are biotechnological products used for different purposes, the main one being to totally or partially replace chemical fertilizers, with an emphasis on N-fertilizers, reducing costs of production and decreasing the contamination of the soil, water, and atmosphere. Brazil has a long tradition in the use of rhizobial inoculants, especially for the soybean crop, but it was only in 2009 that the first commercial inoculant carrying the plant-growth-promoting *Azospirillum brasilense* strains Ab-V5 and Ab-V6 reached the market. One decade after the release of these two strains, 10.5 million doses were commercialized for grasses, including corn, wheat, rice, and pastures, and also co-inoculation of legumes, such as soybean and common bean. Several researches in Brazil presented consistent results of increases in root growth, biomass production, grain yield, uptake of nutrients due to the inoculation with Ab-V5 and Ab-V6. In the soybean season 2019/2020 in Brazil, the inoculation rate with *Bradyrhizobium* to promote biological nitrogen fixation (BNF) in Soybean was of 79%, which represents around 29 million of hectares treated. The need of a continuous increase in yield to attend the soybean demand, stimulate farmers to adopt inputs to guarantee the appropriated supply of Nitrogen. Considering that soybean has around 65 kg of N per metric tonne of grain, it is very important to adopt tools that allow greater efficiency of the BNF. This is the reason why the co-inoculation technique has been gaining more and more space in the agricultural production system. The co-inoculation is the association of two or more species of inoculants. the most widely studied is the association of *Bradyrhizobium* with *Azospirillum brasilense*. In addition to be a N fixing bacterium, *Azospirillum* produces hormones, such as auxins, which stimulate the initial root hairs formation. This effect allows the anticipation in the formation of nodules and a greater number of nodules. All these benefits have been observed in many trials in Brazil. Those results have been impacting on the adoption of the co-inoculation in soybeans. According to a Brazilian market research done by SPARK - ANPII, the co-inoculation technique was used in 9.25 million hectares in the soybean season 2019/2020, which represents an adoption rate of 25%, contributing to the sustainable protein production.

Keywords: Nitrogen; *Azospirillum*; co-inoculation.

### Participants

Jose Roberto Castro - President, ANPII

# SESSIONS

DAY 2 - 01/12/2021

Biostimulants World Congress

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## This session is on hold for EVYP

12:00 - 12:25

Biostimulant Product Development Case Studies

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## Networking Break, Exhibition Viewing & Exhibition Tour

12:25 - 14:00

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## tbc

14:00 - 14:40

SESSION 4: Application Technologies

## Participants

**Heiner Goldbach (Keynote Speaker)** - Professor, Division Plant Nutrition, University of Bonn

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## THE INNOVATION STAGE- ROUND 2

14:00 - 14:40

Biostimulant Business Innovation

During this session 4 companies will showcase their products in short and snappy product info pitches.

1. Biostimulant technology :what is it and how does it work?
2. Recent results
3. Market information linked to this product
4. The biggest hurdle faced developing this product
5. The biggest opportunity we see with this product

Speakers include:

Dr. Katrin Jakob, Business Development Representative USA, Plant Di-Tech

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## Biostimulant seed treatment to enhance germination, symbiosis establishment and early growth of soybean subjected to low temperature

14:40 - 15:05

SESSION 4: Application Technologies

Soybean is a legume that produces protein and oil-rich seeds with high economical values. Soybean yield is highly dependent of favorable weather conditions, notably during early stages of the culture for germination and nodulation. French soybean production has increased by 8-fold in the past ten years thanks to the arrival of high precocity varieties, allowing soybean to be acclimated to sub-optimal weather conditions. Nevertheless, French North climate "especially in Normandy" can expose soybean to low temperatures which could be detrimental during early growth stages. Biostimulants utilization is a strategy which can facilitate seed germination, plant growth and the establishment of an efficient symbiosis for N<sub>2</sub> fixation. To address this question, our goal was to test nine biostimulants (B1 to B9) with known properties for germination stimulation, rhizosphere beneficial micro-organisms enhancement, or symbiosis establishment reinforcement. Biostimulants and Bradyrhizobium inoculum were coated on seeds using a professional liquid seed treater. These coated-seeds were sowed in controlled conditions in a vermiculite / sand mix with temperature close to typical spring Normandy climate (from 12°C to 20°C). After a 70 days culture, plants coming from biostimulant coated-seeds B5 and B9 show a higher fresh weight for nodules (+ 30%), shoots (+ 21%) and leaf area (+ 20%) compared to the control. Further studies will determine if these increased growth traits are linked with changes in plant N status, leaf and root proteomics, hormonal balances and/or grain yield.

## Participants

**Julien Besnard** - Research engineer, University de Caen Normandie

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## Development of novel patented seaweed-based pool of ingredients to enhance plant growth through the soil beneficial bacteria

15:05 - 15:30

SESSION 4: Application Technologies

ALGAIA is the main processor of seaweed in France, producing and commercializing alginates and natural bioactive compounds in particular algal biostimulant ingredients for the global market. ALGAIA is also providing R&D services on macro- and micro-algae to many companies to sustain novel extract development for further valorization of algal wild stocks or cultivated resources.

In many production systems throughout the world, soil management and in particular soil microbial life has been poorly maintained despite its key role in plant physiology. From intensive production practices to general global environmental changes, the impact on beneficial bacteria for plant, named globally as Plant Growth Promoting Bacteria (PGPB), can be quite dramatic.

For two years, the Algaia R&D team located in Normandie (France) has worked on isolation of specific algal compounds for developing and selecting specific mixes to induce systematic growth of PGPBs. In this work, the focus has been to identify, isolate and mix under standard conditions with different proportions, those compounds and assess their benefit towards selected PGPB.

Further work has been developed then to show the benefits of the selected patented extract in order then to double check the benefits of this extract on plants through the soil microbial life.

The development of this work led to propose a standardize commercial product enable to sustain bacterial growth promotion when applied directly to the soil, by soil dripping.

This presentation will focus on technical and scientific data to highlight how all this new product generation has been developed.

## Participants

**Franck Hennequart** - Director for Research & Innovation, Algaia

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## Networking Break, Exhibition Viewing & Poster Tour

15:30 - 16:15

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## Ulva lactuca extract and fractions as seed priming agents mitigate salinity stress in tomato seedlings

16:15 - 16:40

SESSION 4: Application Technologies

The present study investigates the effect of *Ulva lactuca* extract as seed-priming agent for tomato plants under optimal and salinity stress growth conditions. The aims of this experiment were (1) to assess the effect of seed priming using *Ulva lactuca* extract in alleviating salinity stress subjected to tomato and (2) to find out possible mechanism of actions behind such positive effect via means of fractionation of the crude extract and characterization. Salinity stress resulted in a decrease of plants biomass, total sugars, total proteins and total chlorophyll content, and an increase of ROS production and antioxidant activity. However, the application of *Ulva lactuca* methanol extract (ME) and its fractions (residual fraction RF, chloroform fraction CF, butanol fraction BF, and hexane fraction HF) as seed priming substances attenuated the negative effects of salinity on tomato seedlings. RF application resulted in an increase of tomato fresh weight growing in salinity stress conditions. Significant decrease of H<sub>2</sub>O<sub>2</sub> concentration and antioxidant activity in tomato leaves was recorded at ME, RF, and HF treatments under salinity stress conditions. Moreover, these treatments enhanced soluble sugars concentration, total proteins content, and total chlorophyll content of stressed plants in comparison with the control. The Biochemical analyses of *Ulva lactuca* extract and fractions showed that the RF recorded the highest concentration of glycine betaine, while the ME was the part with the highest concentrations of total phenols and soluble sugars. These findings suggests that these molecules might play a key role in the mechanism of action by which seaweed extracts mitigate salinity stress on plants.

### Participants

**Mohammed El Mehdi El Boukhari** - Agronomist / PhD student, University Cadi ayyad

## Proving the impossible: how regulations denying the multifunctional nature of beneficial microorganisms can kill the innovative potential of plant biostimulants

16:15 - 16:40

Regulation & Policy

## Seed applied biostimulants : an efficient way to improve resource use efficiency

16:40 - 17:05

SESSION 4: Application Technologies

Whether it is taken from a regulatory or marketing standpoint, there is a growing scrutiny of how environmental services are solicited in agricultural production : how much water, fertilizers, energy will eventually transform into 1 kg of food ?

Qualitatively, seed applied biostimulants are well positioned to provide new levers to use natural resources in an efficient way. First, by boosting the plant metabolism, they make plant growth less sensitive to a certain deficit in water and nutrients. Second, they do so with products that can be biosourced and applied as seed treatments, meaning that a small amount of input is required (favorable treatment frequency index).

Though those arguments are qualitatively well known, we are still lacking experimental data and thorough statistical and life cycle analysis to tell to which extent biostimulants can help decrease agricultural inputs while keeping the same crop productivity. This was the focus of STIMUL, a EU government funded project. During multiyears field trial campaigns, the quantitative influence of a decrease in water and nutrients was monitored in crops such as corn, soybean, rapeseed and sunflower. Those yield results were compared with those obtained with crops grown from biostimulant treated seeds (derived from natural polymers). We show that on average a ~15% nitrogen input reduction and above 20% irrigation savings are achievable, while keeping the same yield. We conclude by detailing the life cycle analysis of what a seed applied biostimulant can bring.

### Participants

**Jean-Christophe Castaing** - Open Innovation Director, SOLVAY

# SCHEDULE

DAY 2 - 01/12/2021

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TIME	BIOSTIMULANT BUSINESS INNOVATION	BIOSTIMULANT PRODUCT DEVELOPMENT CASE STUDIES	REGULATION & POLICY	SESSION 3: BIOSTIMULANTS, NUTRIENT USE EFFICIENCY AND PRODUCT QUALITY	SESSION 4: APPLICATION TECHNOLOGIES
08:00				08:30 - Keynote: Biostimulants, Nutrient Use Efficiency and Product Quality	
09:00				09:10 - LL004: a novel biostimulant for improved yield and quality in fruits in phosphorus deficiency 09:35 - Bioactivity of humic acids extracted from shale ore: Molecular characterization and structure-activity relationship with tomato plant yield and phenotype	
10:00	10:00 - Networking Break, Exhibition Viewing & Poster Tour	10:00 - Networking Break, Exhibition Viewing & Poster Tour	10:00 - Networking Break, Exhibition Viewing & Poster Tour	10:00 - Networking Break, Exhibition Viewing & Poster Tour 10:45 - A Brassinosteroid-based Biostimulant Integrated with an Innovative Crop System Improves Maize Productivity	10:00 - Networking Break, Exhibition Viewing & Poster Tour
11:00		11:10 - This session is on hold for Stoller 11:35 - This session is on hold for Fertinagro		11:10 - Shaping the rhizosphere: Can in planta rhizobiome selection for phosphate solubilizing bacteria outperform classical in vitro selection methods? 11:35 - Ascophyllum nodosum biostimulants and their role in reducing nitrogen inputs for sustainable crop production	

# SCHEDULE

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12:00	12:25 - Networking Break, Exhibition Viewing & Exhibition Tour	12:00 - This session is on hold for EVYP 12:25 - Networking Break, Exhibition Viewing & Exhibition Tour	12:25 - Networking Break, Exhibition Viewing & Exhibition Tour	12:00 - Co-inoculation using the PG-PR species of Azospirillum brasilense - Brazilian case 12:25 - Networking Break, Exhibition Viewing & Exhibition Tour	12:25 - Networking Break, Exhibition Viewing & Exhibition Tour
13:00					
14:00	14:00 - THE INNOVATION STAGE-ROUND 2				14:00 - tbc 14:40 - Biostimulant seed treatment to enhance germination, symbiosis establishment and early growth of soybean subjected to low temperature
15:00	15:30 - Networking Break, Exhibition Viewing & Poster Tour	15:30 - Networking Break, Exhibition Viewing & Poster Tour	15:30 - Networking Break, Exhibition Viewing & Poster Tour	15:30 - Networking Break, Exhibition Viewing & Poster Tour	15:05 - Development of novel patented seaweed-based pool of ingredients to enhance plant growth through the soil beneficial bacteria 15:30 - Networking Break, Exhibition Viewing & Poster Tour
16:00			16:15 - Proving the impossible: how regulations denying the multifunctional nature of beneficial microorganisms can kill the innovative potential of plant biostimulants		16:15 - Ulva lactuca extract and fractions as seed priming agents mitigate salinity stress in tomato seedlings 16:40 - Seed applied biostimulants : an efficient way to improve resource use efficiency

# SESSIONS

DAY 3 - 02/12/2021

Biostimulants World Congress

Delivered as a Hybrid Event  
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## Keynote: The Future of Biostimulants

08:30 - 09:10  
The Future of Biostimulants

### Participants

**Pierdomenico Perata** - Professor of Plant Physiology, Scuola Superiore Sant'Anna

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## Voice from California Vegetable Growers on Crop Biostimulants: Impression, Concern, and Hopes

09:10 - 09:35  
The Future of Biostimulants

Crop biostimulants become popular among ever-greater number of vegetable growers in California regardless of production system, scale, and commodity. Since biostimulants are multi-functional and numerous, it is extremely complex to choose a right product from the long list and use it at the right time in a right way. Particularly to California vegetable growers who operate farming at every scale that differs widely in climates and cultural practices, the first and maybe the foremost step toward a more effective use of crop biostimulants is to understand growers' current use, experience, concerns, and hopes. To collect the specific information, a survey was sent to approximately 648 California vegetable growers mainly in the San Joaquin Valley and other California counties in October 2020. The survey included eight questions asking growers how they farm and their experience and opinions to crop biostimulants. Of the 83 valid responses (12.8% of total surveys sent) from 21 California counties, 68% indicated that biostimulants could conditionally confer their efficacy in vegetable fields. Regarding their biggest concerns of using crop biostimulants, majority of the respondents worried about lacking effective guidance on choosing a product followed by low or no return on investment. Nearly 90% of respondents (strongly) agreed the need to take each future action listed in the survey in improving the use of biostimulants. The responses reflect the hopes from growers, and their voices will be critical for academia, industry, extension, and other public sectors to outline future efforts aiding a practical and profitable use of biostimulants.

### Participants

**Zheng Wang** - Cooperative Extension Vegetable Crops Farm Advisor, University of California Cooperative Extension

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## Bioengineered naturally occurring signal molecules, a new generation of plant biostimulants

09:35 - 10:00  
The Future of Biostimulants

Most of the current plant biostimulants are based on beneficial microbials or complex bioactive mixtures extracted from natural sources. This first generation of commercial products have successful been used to optimize nutrient uptake, crop yield, quality, and tolerance to abiotic stresses. In this work, the approach is completely different, and consists of using a well-defined biomolecule acting as signal in plant to develop new plant bioestimulants. Signal molecules naturally occurs in plants, but at a such low concentration that extraction from plants material is often not economically viable. Alternatively, these biomolecules can be produced by eco-friendly bioprocess. This presentation will also explain how this innovative molecule acts like pre-activator of the plant tolerance mechanism to stressful situations. When exogenously applied on plants, this biomolecule is perceived by the plant cells and trigger a noteworthy changes in genes transcription across multiple processes (response to water deprivation, osmotic and salt stress, pathways (ABA, JA, GA-), and cell functions. This reprogramming of the plant metabolism modulates some key plant responses to abiotic stresses, including the accumulation of osmo-protectants like proline and other low molecular weight metabolites, changes in the activities of ROS protective enzymes (SOD, APX) and accumulation of anthocyanins, among others. In addition to the results explaining the mode of action of this signal molecule on plants, some experiments simulating water stress in radish and wheat seedlings under controlled conditions and the performance of the formulated product in field condition on wheat, tomato, soybean and peas will be shown and discussed.

### Participants

**Guillaume Wegria** - CEO, FYTEKO

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## Networking Break & Exhibition Viewing

10:00 - 10:45

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## Synthetic biology for unmet agriculture needs

10:45 - 11:10  
The Future of Biostimulants

JoynBio develops high-performing biologicals that will become a new class of sustainable agriculture solutions. We aim to provide growers with new solutions to feed and nourish the world. By engineering crop-colonizing microbes, we can develop a new class of biologicals that are sustainable and reach unprecedented levels of performance and reliability. In this presentation, we will address our first challenge, which is aimed at significantly reducing agriculture's reliance on synthetic nitrogen fertilizer by engineering bacterial nitrogen fixation.

### Participants

**Guillaume Barbier** - Biofertility program director, JoynBio

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## Panel Discussion Regulatory Framework and Update.

11:10 - 11:35  
The Future of Biostimulants

# SCHEDULE

DAY 3 - 02/12/2021

Biostimulants World Congress

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TIME	THE FUTURE OF BIOSTIMULANTS
08:00	08:30 - Keynote: The Future of Biostimulants
09:00	09:10 - Voice from California Vegetable Growers on Crop Biostimulants: Impression, Concern, and Hopes 09:35 - Bioengineered naturally occurring signal molecules, a new generation of plant biostimulants
10:00	10:00 - Networking Break & Exhibition Viewing 10:45 - Synthetic biology for unmet agriculture needs
11:00	11:10 - Panel Discussion Regulatory Framework and Update.